Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 2	)	General Docket No. 87-14
of the Commission's Rules	)	RM-4829
Regarding the Allocation	)	RM-4831
of the 216-225 MHz Band	)	RM-4983

To: The Commission

REPLY COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

Christopher D. Imlay,
Booth, Freret & Imlay
1920 N Street, N.W., Suite 520
Washington, D.C. 20036
(202) 296-9100
Counsel for The American Radio
Relay League, Incorporated

June 19, 1987

TABLE OF CONTENTS

		Page
SUMMARY		i,ii
I.	Introduction	1
II.	Comments of the Amateur Radio Community	2
III.	Comments of Non-Amateur Entities in Support of a Continued Amateur 220-225 MHz Allocation	16
IV.	Comments of Broadcast Television Entities	24
V.	Comments of Land Mobile Representatives	26
VI.	Comments of Other Aspirants to a 220-222 MHz Frequency Allocation	42
VII.	Conclusion	44
CERTIFICATE OF SERVICE		

SUMMARY

The American Radio Relay League, Incorporated replies to several of the more than 2,000 comments filed in this proceeding. The conclusions to be drawn from these Comments are as follows:

1) The Amateur Radio Service uniformly expresses great frustration at the erroneous premises on which the Commission's proposed reallocation is based. The vast majority of these comments are from amateurs, each opposed to the proposal. The amateur service depends on the 220-222 MHz allocation for newly-developed, high-speed packet communications, fixed links, repeater control and auxiliary operation, and weak-signal propagation studies. The Commission has failed to acknowledge either the value or quantity of amateur communications at 220-225 MHz, and the inability to reaccommodate the various uses of 220-222 MHz either at 222-225 MHz or elsewhere.

2) Many emergency and public service agencies filed comments in support of retaining amateur radio use of the entire 220-225 MHz band, noting that amateur emergency communications through repeaters and via packet networks would be irreparably harmed by the proposed action.

3) Broadcast television entities, concerned about interference to Television Channels 11 and 13 from land mobile operation at 220-222 MHz, suggest, in addition, that a better means of encouraging spectrum efficiency would be to phase in 5 kHz channels in existing land mobile bands.

Digitized by the Internet Archive
in 2025 with funding from
Amateur Radio Digital Communications, Grant 151

https://archive.org/details/com-arrl-amendent-pt2

4) The few land mobile entities which filed comments indicated no strong or reasoned support for the allocation. Most simply parrot the Commission's erroneous assumptions in the Notice. LAOAD, one of the petitioners, specifically disclaimed any desire to disenfranchise amateurs in the 220-225 MHz band.

5) Finally, other proposals for non-amateur, non-land mobile uses of the 220-225 MHz band are outside the scope of this proceeding and in any event do not offer meaningful alternatives to the only course of action justifiable under the circumstances, which is retention by the Amateur Radio Service of the entire 220-225 MHz band.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 2	)	**General Docket No. 87-14**
of the Commission's Rules	)	RM-4829
Regarding the Allocation	)	RM-4831
of the 216-225 MHz Band	)	RM-4983

To: The Commission

REPLY COMMENTS OF
THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

The American Radio Relay League, Incorporated (the "League") hereby submits its Reply Comments in this proceeding, in response to those comments filed pursuant to the Notice of Proposed Rule Making (the "Notice"), FCC 87-45, 52 Fed. Reg. 6024, released February 12, 1987. These Reply Comments are timely filed in view of the Order Extending Time for Comments, DA87-364, released April 15, 1987. For its Reply Comments, the League states as follows, in support of a continued amateur radio allocation of the 220-225 MHz band.

I.
Introduction

1. The comments filed in this proceeding, numbering over 2,000,[1/] each fall into one of a series of categories. The

---

1/ This is the League's best guess of the number of Comments, based on review of Public Reference Room files. Apparently, not all Comments filed are included in such files, and it is thus inevitable that the instant Reply will omit reference to some. Any such omissions are not necessarily to be construed as support or acquiescence thereof on the League's part, and the League may well be forced to submit Supplementary Reply Comments, should certain comments surface later.

first, constituting virtually all of comments, are from individual amateur radio operators, amateur clubs, volunteer frequency coordinating entities and groups representative of amateur radio interests generally. The second category includes the comments of non-amateur organizations and entities which make use of or rely upon emergency and public service communications of amateurs, in support of continued amateur access to the 220-225 MHz band. In a third category are the comments of broadcast entities concerned about interference from the proposal to licensed television broadcast operation on Channels 13 and 11. In a fourth category are the few supporting comments of the land mobile industry. Finally, there are one or two proposals for alternative uses of the 216-225 MHz band, which are essentially counterproposals; they are not responsive to the Notice proposals. The comments in the above categories will be addressed seriatim. The comments of amateur equipment manufacturers were discussed in the League's Comments and are not separately discussed herein. However, these entities stand to be seriously affected by the Commission's proposal; the League urges the Commission to recognize the impact on these small business entities.

II.
Comments of the Amateur Radio Community

2. The Amateur Radio Service has established, by its thousands of comments in this proceeding, a unified expression of

righteous indignation at the proposed deprivation of two megahertz of critical support spectrum at 220-222 MHz. We are absolutely at a loss to understand how the Service can carry out its mission, set forth in §97.1 of the rules, should the proposed "reallocation" be effectuated. The comments of the amateur community establish, without exception, that the Commission's proposal to take 40 percent of the 220-225 MHz band from amateurs is based on an absolutely incorrect premise--that the 220-222 MHz segment is "not significantly used" by amateurs. The amateur comments are highly critical of the Commission's reference to the League's Repeater Directory as a basis for that premise, and rightly so; the Directory was never intended to be a listing of other than repeaters. It does not even list all repeaters for reasons discussed in the League's Comments. It contains essentially no information concerning non-repeater uses in the 220-225 MHz band.

3. The Commission's error, however, is not entirely of its own making, but rather is a misconception generated earlier by NTIA in its Assessment of Narrowband Modulation Technologies for Government Land Mobile Operations, NTIA Report 84-156 (July, 1984). In its limited analysis of the 216-225 MHz band, NTIA stated generally that:

> A spectrum resource assessment of the 216-225 MHz band (NTIA TR-81-85) points out that generally, the 216-225 MHz band is not extensively used throughout the United States.

* * * * *

> An area of concern in the 220-225 MHz portion of this band is the potential interactions with amateur assignments. Data gathered by the American Radio Relay League, Inc., and published in the 1981-1982 edition of the ARRL Repeater Directory indicate that repeater assignments are predominant in the upper portions of the band. Figure 27 gives an indication of the number of amateur repeater assignments versus discrete frequency [sic].

* * * * *

NTIA then offered a graph of these "repeater versus discrete frequency" assignments, which, of course, showed no repeater operation below 222 MHz, nor indicated on what its assessment of 220-222 MHz occupancy was based. Though the 1984 study referenced the 1981 NTIA study of Spectrum Resource Assessment in the 216-225 MHz Band as the sole basis for its discussion of amateur use of 220-225 MHz, it omitted most of the material in that 1981 study relative to amateur use of the 220-222 MHz band,[2/] thus leaving the reader with the false impression that amateurs heavily use 222-225 MHz but do not use the 220-222 MHz segment. Nor is it proper to refer to amateur "frequency assignments" since there are none in the Service. The 222-225 MHz segment is

2/ The 1981 NTIA study noted that "the 220-222 MHz portion of the band is used by the amateurs for point-to-point communications using single sideband (SSB) and FM modulation techniques. Experiments are conducted involving propagation and long-distance communications." (p.15.)

Further, in connection with the RSMS spectrum measurements conducted by NTIA in 1981, the study noted that "the signals below 222.0 MHz are most likely amateur fixed stations not working with repeaters. These are used for point-to-point communications." (p.18.) Finally, "the upper 5 MHz, 220-225 MHz, is used extensively by the Amateur Radio Service. . . ." (p.33)

"channelized" to the extent that FM repeaters operate in that segment, but the 220-222 MHz segment is not.[3/] What the 1984 NTIA Narrowband Modulation Technologies study and the Commission's Notice in the instant proceeding incorrectly assumed from this incomplete information was that 220-222 MHz was underutilized.

4. The comments in this proceeding amply demonstrate that this is not true. Rather, the type of amateur operation conducted at 220-222 MHz is not readily evaluated by the type of monitoring study conducted by NTIA in 1981. The development of amateur frequency coordination, made necessary by VHF overcrowding in the Amateur Service, and the advent and unprecedented acceptance of packet technology in the Amateur Radio Service, have rendered prior (six-year-old) band loading conclusions totally obsolete anyway.

5. A good discussion of the extent of amateur use of 220-222 MHz is found in the Comments of the Vermont Independent

3/ The Comments filed in this proceeding by Arnold L. Chase detail the history of this divergence. Though repeater operation in the Amateur Radio Service was initially authorized in 1972 [See the Report and Order in Docket 18803, 37 FCC 2d 225 (1972)], the frequencies authorized in the 220 MHz band for such operation were limited to 222-225 MHz. Thus, voluntary band plans developed which relegated the many non-repeater amateur uses to the segment below 222 MHz. Operating habits were already established when, in 1977, the Commission expanded amateur repeater subbands to include frequencies below 222 MHz in the band. See Report and Order, Docket 21033, 66 FCC 2d 207 (1977).

Repeater Coordinating Committee (VIRCC), a repeater and remote base coordinator in Vermont:

> As coordinator for this area, we have access to regional data covering most of the northeast on usage of 220-225 MHz. Our data clearly indicates that the spectrum is not underutilized and is growing faster than any other amateur band. We are already past the point where activity occurring in the 220-222 MHz portion of the band could be accommodated at 222-225 MHz. There is too much activity to allow this without causing severe degradation of the existing service . . .
>
> * * * * *
>
> No weak signal CW, SSB or moonbounce (EME) communications take place above 222 MHz. These modes are found exclusively on 220-220.5 MHz. The spectrum between 220.5 and 221 MHz is allocated for high-speed packet, requiring 100 kHz channel spacing. The remaining spectrum, between 221 and 222 MHz is used for standard packet channels and control and auxiliary links.
>
> * * * * *
>
> Our database . . . shows 26 listings for control frequencies and packet frequencies in the 220.5 to 222 MHz range. Many of these frequencies are used atop mountains to link various repeaters together. It is not suitable to mix auxiliary links with repeater inputs or outputs due to high potential of harmful interference. The 100 kHz wideband packet channels, for use with high speed 9600 baud systems, are totally incompatible with the existing 20 kHz spacing of the repeater bands.
>
> The weak signal communications on 220-220.5 MHz must be located far away from strong FM signals, such as those found on the repeater subband. Because of the very weak nature of signals being received, wideband

> noise from FM signals nearby in frequency would render this form of communication useless.
>
> (VIRCC Comments, at 1,2.)

From this discussion, it is apparent that the loss of the 220-222 MHz segment will have a profound and non-remediable impact on existing amateur facilities. Elaborate moonbounce arrays would have to be completely rebuilt; newly-established packet digipeaters at remote locations would be displaced; control and auxiliary stations would have to be relocated or removed; and weak-signal operation in the band would be lost entirely. Given the high growth rate[4/] of amateur repeater operation and the associated increase in control links, the future needs of amateur radio can only be be satisfied with full retention of the 220-222 MHz segment.

6. The need to accommodate amateur packet operation at 220-222 MHz was detailed in the Comments of Philip R. Karn, Jr., an Assistant Vice President for Engineering with the Radio Amateur Satellite Corporation (AMSAT) and a member of the League's Committee on Amateur Radio Digital Communication. Mr. Karn has developed high level computer networking protocols for the Department of Defense and has adapted several for amateur packet

4/ VIRCC notes a 25% annual growth rate in amateur repeater operation at 220 MHz (VIRCC Comments, at 2).

use. Of the need for continued amateur access to the 220 MHz band, Mr. Karn states:

> Amateur packet radio ("packet") is no longer just an "experimental" mode. Because of its unique suitability for the formal record-style communications characteristic of emergency relief efforts, it has already made major contributions to Amateur Radio's public service mission. For example, about 100 urgent "health and welfare" messages were handled by portable packet stations in the Baltimore area following the collision of an Amtrak passenger train with a Conrail locomotive in January 1987. In 1986, amateur packet radio rendered substantial assistance to California forest fire fighting efforts. These and other experiences underscored the need to build cross-band "gateway" facilities to handle large amounts of traffic more efficiently. FM voice repeaters were already well entrenched in the 144.5-145.5, 146-148 and 222-225 Mhz bands by 1984 when packet began its explosive growth; it was therefore natural that packet should grow into 220-222 Mhz. As a result, "backbone" packet links in that range are now commonplace, and intercity relay of electronic mail depends heavily on their use.
>
> If this Docket is adopted, however, these vital operations would have no place to go. This is especially true of high speed, wideband operations. In the New York area, the channel 220.5-222.5 Mhz has been coordinated for high speed digital transmissions. For several years I have had experimental high speed modems designed by Mr. Steve Goode, K9NG, on 220.55 Mhz. Production quality high speed radio modems based on Mr. Goode's and other designs and operating at speeds of 9,600, 19,200 and 56,000 bits per second are just now appearing on the amateur market. Most are designed specifically for the 220 Mhz band. Along with developments in higher level protocols, these modems promise a quantum leap in the ability of amateurs to handle emergency relief traffic -- if the spectrum rug is not pulled out from under us.

> The 220 Mhz band is both popular and essential for this work because it is the lowest frequency on which wideband (20 - 100 Khz) transmissions are permitted, and because it is still low enough in frequency to have favorable propagation characteristics. This is very important in the initial stages of network development when the stations are spaced relatively far apart, and individual volunteers (not clubs) are financing their own efforts. Forcing high speed packet activities to the higher bands would not only cripple the growth of packet radio and render much brand new and long-awaited equipment obsolete, but also reduce the chance that a group of innovative users willing to invest in highly specialized UHF packet modems would be able to communicate with each other. I can attest to this "critical propagation mass" phenomenon from personal experience; I have good propagation on the 144-148 and 220-225 Mhz bands to Bob McGwier, N4HY, with whom I have done much of my initial higher level protocol testing, but conditions are marginal at best on the 420 Mhz band.
>
> (Karn Comments, at 1,2.)

Mr. Karn also discusses another critical use of the 220-222 MHz segment, that of terrestrial links to satellite gateway stations:

> The 220 MHz band is well removed from existing Amateur Satellite allocations. This makes it invaluable for terrestrial links to "satellite gateways" (stations relaying signals between terrestrial users and amateur satellites). Because satellite signals are among the weakest that amateurs work with, it is nearly impossible to eliminate interference between the terrestrial and satellite halves of a gateway when both links are on the same amateur band. Existing satellites already use portions of every available VHF/UHF Amateur Satellite allocation (145 MHz, 435 MHz, 1268 MHz and 2400 MHz). The unique suitability of the 220 MHz band for terrestrial/satellite gateways (both digital and analog) therefore becomes apparent.
>
> (Karn Comments, at 2.)

7. That amateur packet communication inherently offers vastly improved emergency communications possibilities is not merely a prediction. As noted in the Comments of the Middle Atlantic FM and Repeater Council (T-MARC), the emergency capabilities of packet networks have already been proven:

> Small, portable packet stations can readily be carried directly to the scene of nature of man-made disasters, to provide high-speed printed communications into and out of the disaster area. Because of the nature of packet communications, messages need be typed ONLY ONCE at the point of origination, and will be relayed error-free to the ultimate destination where a printed copy of the message will be produced. The usefulness of this capability has already been proven many times, such as Amateur assistance to the California Department of Forestry at several severe brush fires, and at the recent Amtrak railroad accident near Baltimore, Maryland.
>
> (T-MARC Comments, at 8.)

T-MARC also noted the Commission's express support of the development of amateur packet technology on all frequencies above 220 MHz:[5/]

> When the Commission adopted rules to permit packet radio communications in the Amateur service it stated "The Commission appreciates the desire of the amateur community to experiment and operate with state-of-the-art digital technology. Therefore, in order to avoid hampering these endeavors we are authorizing...a sending speed as great as

5/ See the Report and Order, PR Docket No. 81-699, 52 RR 2d 397, 399 (1982). The authorization of bandwidths up to 100 kHz was to "permit the greatest flexibility in spectrum utilization" on 220 MHz and above.

> 56 kilobaud and a bandwidth as great as 100 kHz...on all frequencies above 220 MHz...". Based upon this apparent encouragement by the Commission, Amateurs in many parts of the country have amended the national band plan to provide spectrum in the 220 MHz band for both medium speed (1200 baud) and high speed (56 kilobaud) packet operations. In particular, a portion of the 220.5 to 222.0 MHz band is being used for these operations, which is fully coordinated with the local frequency coordinators, so as to minimize the interference potential to non-digital Amateur operations in this portion of the band. Specialized receiving and transmitting equipment is being developed by Amateurs for high-speed packet transmission, since such equipment is not available from the normal Amateur equipment sources.
>
> Digital operations have now developed beyond the "experimental" stage to an operational stage, including Local Area Networks (LAN's), Packet Bulletin Board Stations (PBBS's), and wide-area store and forward networks. High speed store and forward systems are being installed using the 220.5-222.0 MHz band, and new higher-level protocol firmware programming is being developed to support networking capabilities, commonly referred to in packet-radio circles as "layer three" and "layer four" networking protocols. There is NO SPECTRUM AVAILABLE FROM 222-225 MHz to support high speed data communications!
>
> (T-MARC Comments, at 8.)

To the above the League would add that spectrum above the 220-225 MHz band cannot substitute for 220-225 MHz either, due to propagation limitations. The Amateur Radio Service has developed this technology, which provides an infinitely greater degree of spectrum economy than does present analog land mobile technology. It would be a foolish act indeed for the Commission to crush its development in its adolescent phase by depriving it of spectrum

necessary to link local cells of packet users into a single, national, high-speed terrestrial system. To substitute narrowband analog land mobile technology is a huge step backward, especially considering the lack of market acceptance of amplitude companded SSB land mobile equipment, and the multitude of technical and economic reasons therefor, unrelated to spectrum allocations. In this connection, the League notes that the land mobile industry is aware of the need to develop digital technology. In an article by James Mikulski entitled "Land Mobile Communications in the Information Society" (Mobile Radio Technology, January, 1985 at p.24), the author notes that the inevitable shift to digital land mobile communications[6/] requires an emphasis on FM, and that single-sideband systems focused on narrowband "channel splitting" inhibit the ability to develop higher data rate services than those that exist today. Thus, use of such technology is of questionable value and wisdom:

> Single-sideband systems have held the promise of 5 kHz channel spacing. But the demonstrated channel spacings required to realize a 60 dB to 70 dB adjacent-channel protection, based on measurements made by the National Telecommunications Information Agency, range from 8.3 kHz to 12 kHz. These measurements were made with VHF-band equipment and are exclusive of stability considerations and channel guard space. At

6/ The author cites a 1981 FCC study entitled "The Future of Digital Telephony in the Private Radio Services" (August, 1981) in which the Commission expressed the expectation that digital transmission will predominate throughout the private radio services early in the next century.

these levels of adjacent-channel protection, which are characteristic of the service currently provided in land mobile radio, any advantage of single-sideband relative to reduced deviation FM is small or non-existent. (Emphasis added.)

Single-Sideband Questioned

With these results for a system design focused on analog voice having been presented to the industry, and with the expected future growth of data for which a FM system is more suitable, any large investment in the development of single-sideband must be seriously questioned. Would it continue to evolve and serve future communications needs? Would it only be a short-term solution to today's problems?

Narrowbanding itself must be given careful appraisal at this point in terms of its ability to handle future communications needs. Once such step is taken, narrowbanding inhibits the ability to develop higher data rate services than those that exist today. In view of the expanding dimension of the data rate requirements projected by such services as ISDN, this may be a serious limitation. Perhaps a different approach is needed. Once again, wireline services may be showing the U.S. land mobile industry the way, along with mobile radio system designers in other countries who are following the early lead.

* * * * *

The Amateur Radio Service, in the development of packet radio technology at 220-222 MHz, is thus making far better use of the band than would the Land Mobile Services using narrowband SSB there. Amateur packet networks are the precursor of future land mobile packet operation, with spectrum economies far greater than those achievable by the Commission's instant proposal. If the Amateur Radio Service retains the undisturbed use of 220-222 MHz,

the development of higher packet protocols discussed by Karn, supra, may, in the end, be more useful to the Land Mobile Service (as free R&D) than the intrinsic value of the two megahertz of space.

8. Lest the Commission perceive that use of the 220-222 MHz band for packet communications is limited to the East and West Coast populous areas, the Comments of Raymond L. Browning, Sr. are noteworthy. Mr. Browning is a communications engineer dealing primarily with microwave and mobile radio communications.

> The proposed rulemaking conflicts with plans that were formulated in Southern Indiana and Western Kentucky regarding packet radio communications. Portions of the 220-222 MHz spectrum will be required in the near future in our area to link distant states into a homogenous system capable of handling normal amateur communications, and also emergency communications. Emergency communications to be handled are as occur whenever the normal communications system is disrupted by Act of God, or by acts of man. Western Kentucky and Southern Indiana are within the direct influence of the New Madrid earthquake fault zone. Funnel clouds and tornadoes occur every springtime and summer within our area. Also coursing through our area are five major rivers which are subject to flooding from an abundance of rain (the Ohio, Tennessee, Cumberland, Green, and Wabash rivers). Exercises are conducted on a regular basis to test our preparedness for these eventualities. Packet radio has been included in the tests successfully several times recently as an efficient method for moving formal messages out of and into a disaster area.
>
> (Comments of Browning, at 1.)

9. Other than weak-signal operation and packet radio, the loading of 220-222 MHz with fixed links, remote bases and, in

certain areas, even repeater operation, is critical. The Comments of the 220 MHz Spectrum Management Association of Southern California and the North Hollywood Remote Base Association note that 220-222 MHz is fully saturated in Southern California with repeaters, remote bases and auxiliary links, almost all of which require multiple stations coordinated on a co-channel basis. These stations cannot be relocated above 222 MHz, and so would be displaced entirely by the Commission's proposed action. The auxiliary links in that segment support not only 220 MHz repeaters, but also repeaters at 29, 50-54, 144-148 and 420-450 MHz as well. The "disruption to the existing 220-222 MHz systems will be irreparable and the uncompensated monetary damage to these system's owner-operators will be incalculable." (220-SMA Comments, at 12.)

10. Finally, as to the displacement of weak-signal amateur communications from the 220-222 MHz band, William A. Tynan, who has since 1945 specialized in amateur communications above 50 MHz, noted the impossibility of accommodating amateur weak-signal operation above 222 MHz because of the proximity of nearby FM voice transmitters, even if band loading above 222 MHz were not as heavy as it is. The effect is a serious loss in ongoing propagation research:

> Elimination of weak signal activity from this very valuable and scientifically interesting part of the radio spectrum would represent a severe blow to Amateur Radio's ability to carry on experiments into various types of propagation. Sporadic E propagation is a case in point. It has been observed at 220 MHz in rare instances. However, no two-way

> contacts have been confirmed as yet. It would be a shame if lack of a suitable frequency allocation prevents amateurs from demonstrating, through such contacts, that this still mysterious ionospheric propagation mode is a factor in this part of the radio spectrum. Contacts via meteor scatter and aurora reflections are quite frequent at 220 MHz and are responsible for much of the long haul work reported on the band. All of this work would be sacrificed by implementation of the proposal, and the band used for little more [than] the 50 miles or so local operation characteristic of FM.
>
> (Tynan Comments, at 2.)

11. Overall, the comments of the amateur radio community express great frustration over the lack of recognition of the value and quantity of the communications conducted at 220-222 MHz. The point is repeatedly made in the comments that the assumption of the Notice relative to the "minimal impact" on the Amateur Service from the instant proposal is absolutely wrong. The comments which were filed in response to the individual petitions on which this proceeding was based pointed this out. It remains a mystery why the comments of the amateur community were ignored then, and it is genuinely hoped that the Commission will recognize in its analysis of the comments the critical need of the Amateur Radio Service for continued access to the entire 220-225 MHz band.

III.
Comments of Non-Amateur Entities in Support of a Continued Amateur 220-225 MHz Allocation

12. Numerous entities, not directly involved with amateur radio, have submitted comments in this proceeding discussing the benefits derived from amateur radio and the need to maintain

existing frequency allocations for amateurs at 220-225 MHz. The Department of General Services of the Commonwealth of Pennsylvania, for example, opposed the creation of a new land mobile segment for narrowband technology which is remote from existing VHF and UHF land mobile spectrum. It states that:

> It is a consensus . . . within this office that the narrowband technology spectrum should be in or adjacent to existing VHF high band and UHF land mobile spectrum. Two megahertz of spectrum, which would be further shared with U.S. Government operations, offers little incentive to design new regional or statewide communications systems in this proposed spectrum.
>
> * * * * *
>
> It is further recommended that the 220-225 MHz spectrum be retained within the Amateur Radio Service . . . [T]he Commission does not have any data or sources of data to determine the extent of use of the 220 MHz band for control links and auxiliary operations, which must be above 220.5 MHz. Consequently, the Commission has not properly determined the true loading, useage, and importance of the 220-225 MHz spectrum in the Amateur Radio Service.
>
> (Commonwealth of Pennsylvania Comments, at 2,3.)

13. The Comments of Orange County, California, recognized the utility of 220 MHz amateur radio communications, and the "significant adverse effect" on public service communications of the Commission's proposed reallocation. With respect to both regional repeater linking and packet radio network linking, use of 220-222 MHz fixed stations to permit wide-area emergency communications coverage is absolutely necessary.

14. The serious adverse effect on amateur emergency communications, ignored in the Notice in this proceeding, was nonetheless recognized by many state and municipal emergency preparedness agencies. The State of New York Emergency Management Office, which benefits from the emergency communications assistance of hundreds of amateur operators, has noted utility of packet communications in the 220-222 MHz band. It notes further that many of the statewide 144-148 MHz repeaters used for RACES (Radio Amateur Civil Emergency Services) use control links in the 220-222 MHz band. In summary, the New York State Radio Officer concludes that the loss of the frequencies would be a setback to the New York RACES program and its communications capabilities. The State of Massachusetts Civil Defense Agency and Office of Emergency Preparedness states that loss of the 220-222 MHz segment would be "extremely detrimental" to the state-wide coordination of the Radio Amateur Civil Emergency Service (RACES). Similar sentiments were expressed by the Unified San Diego County Emergency Services Organization, which believes that the elimination of a portion of the 220 MHz band could severely impact the ability of the County to properly coordinate a major emergency. The Sheriff of San Diego County echoed that point, noting that public safety would better be served by allocating other frequency spectrum to the exploration of new technology for the land mobile service. The Operations Officer of the Office of Disaster Preparedness of San Diego County noted that the earthquake

emergency plan for Southern California calls for 45 simplex networks between 220 and 222 MHz. He suggests that land mobile should be given space in the underutilized 216-220 MHz band, and that a more vigorous attempt to integrate 5 kHz equipment into the 150-174 MHz segment should be made rather than displacing the Amateur Radio Service from the 220-222 MHz segment.

15. The Comments of the Radio Officer of the City of Sacramento, The Encinitas (California) Fire Protection Department, and the Monroe (Michigan) Fire Chief and Civil Preparedness Coordinator each actively urged retention of the amateur radio allocation at 220-222 MHz. Riverside County, California, noting the extensive public safety and emergency communications use of the 220-222 MHz segment, views the encroachment upon amateur frequencies by the Land Mobile Service as a "dangerous precedent" and would imply that the Amateur Radio Service is secondary in importance to business uses. The City of Monroe, Michigan, noted the ability of amateurs to use packet radio at 220-222 MHz in emergencies to provide dependable, secure communications without interference to nearby high-band VHF communications.

16. The Air Force Association Chapter in Fairbanks, Alaska noted the use made of digital packet telecommunications for search and rescue in interior Alaska:

> With the advent of the Novice Enhancement program and the accompanying expansion of voice repeaters in the upper portions of the 220 MHz band, the useage of the 220-222 MHz

> portion for packet digipeating and weak signal tracking has become essential. The Amateur Radio operators in our search and rescue organizations--both Civil Air Patrol and regular Air Force--are very concerned about the potential loss of the frequency spectrum needed for Alaska statewide emergency digital communications via Amateur Radio channels.

17. Several American Red Cross Chapters noted the need to retain the amateur 220-222 MHz allocation including the Scranton, Pennsylvania Chapter; the Monroe County, Michigan Chapter; the Oregon Trail Chapter; and the Niagara Falls Chapter. The Scranton, Pennsylvania Chapter noted the use by amateurs of 220-225 MHz for priority disaster communications:

> In our area we depend heavily on the area amateur radio operators for our disaster communications. The hams utilize the 220 Mhz. band for the majority of priority communications; through a few area repeaters, but more so through direct transmissions and Packet communications. The 220 band was selected for the priority transmission because of the fact that very few scanners are capable of receiving these transmissions. This fact resulted in its selection as the key band for all transmissions to and from our nearby Nuclear Power Plant in case of any emergency.

A similar view was expressed by the Oregon Trail Chapter. It noted that the Commission's assumptions concerning amateur use of 220-225 MHz are incorrect, and that other spectrum, especially the 30-50 MHz land mobile allocation, should be utilized for narrowband operation:

> The Land Mobile service has abandoned the 30-50 MHz spectrum in droves. The Communications Unit [of the Oregon Trail Chapter] has had problems obtaining quality equipment for the 47 MHz Red Cross emergency frequency, due

> to manufacturers unwillingness to build equipment when there is no market. This low useage of 30-50 MHz is not an indication of a great need for spectrum.
>
> (Comments of American Red Cross, Oregon Trail Chapter, at 6.)

The Oregon Trail Chapter also notes that the Notice statement that the 220-225 MHz band is unused is in error due to limited data upon which the statement is based.

18. A number of comments were filed by engineers, some of whom are amateurs, some not. These provide some specific insight into technical problems associated with the Commission's proposal, and some far more reasonable alternatives. The R.W. Johnson Company Consulting Engineers, after noting the error in the assumed lack of amateur occupancy of 220-222 MHz,[7/] suggested additional unused UHF TV channel sharing. The Society of Broadcast Engineers ("SBE"), the organization of more than 5,000 engineers and technicians from all portions of the communications industry, notes that the plan to allocate two megahertz of amateur spectrum to existing narrowband land mobile is both flawed in its premises and harmful to amateur radio, from which much of the country's communications engineering community first derived its interest in engineering. The allocation of two megahertz,

7/ Those Comments note that, because of the use of directional antennas and the line-of-sight character of propagation at 220 MHz, there could be heavy congestion in some areas that would go unmeasured by sampling just a few miles away.

which requires one megahertz channel spacing, is not practical for land mobile repeaters given current filtering techniques. Nor is it reasonable to assume that land mobile repeater output transmitters will be coordinated with amateur repeater input channels in the adjacent band, or filtered adequately to prevent noise from desensitizing adjacent amateur receivers. Overall, SBE called the Commission's proposal a gross misallocation of resources, noting that the land mobile industry will not seriously seek to implement more spectrum-efficient technology until spectrum management policies force it to do so. The representatives of the land mobile industry have based their request for additional spectrum on the technical inadequacies of narrowband amplitude companded SSB systems, and the industry has failed to improve the technology. Amateurs, notes SBE, have developed a superior amplitude-companded SSB system which uses a centered pilot tone and digital modulation techniques. More efficient technology is possible. Thus, narrowband SSB modulation in the Land Mobile Service is not yet at an implementation stage--rather, it is a developmental mode.

19. Finally, the Comments of William G. Bowles, P.E. question why, if the Commission is serious about encouraging the use of narrowband technology to promote spectrum efficiency, it seeks new spectrum for the mode. The logical way to encourage conversion to ACSB is to develop it in existing bands, rather than allocating a separate bit of spectrum which will not encourage

present FM users to switch to the new mode. With the newly-mandated frequency coordination in the 150-162 MHz band, it would be a simple matter to designate a segment of this band to be closed to new applicants using FM, but open to ACSB applicants on splinter channels. Existing FM users could be given a transition period to either switch to ACSB or move to a segment of the band where FM is still allowed. This makes far more sense than does allocation of non-contiguous spectrum at 220-222 MHz, which will have no effect on conversion of existing wideband communications to narrowband technology.

20. Overall, the commenters representing non-amateur entities which are supportive of a continued amateur allocation at 220-222 MHz recognize the fallacy of the Notice assumption of non-use by amateurs of that band. The revolutionary application of high-speed packet technology in amateur emergency communications, which requires the use of 220-222 MHz, is recognized by emergency preparedness agencies in states and municipalities throughout the country. It is technology which cannot be stifled by the Commission if the Amateur Radio Service is to do its job. As NTIA is willing to defer to DOD expertise relative to the development and implementation of narrowband technologies, the participation of the DOD in this proceeding should be accorded significant, if not determinative weight. Should it be concluded by the DOD that narrowband land mobile communications are best accommodated elsewhere, so as to permit the unfettered development of amateur packet communications, with its obvious benefits

in times of wide-area crisis or emergency, the Commission should accept that recommendation.

IV.
Comments of Broadcast Television Entities

21. The Comments of the Association of Maximum Service Telecasters ("MST") are supportive of the concept of encouraging narrowband technologies. It does not, however, accept the premise that there is any present spectrum shortage in the Land Mobile Service. Nor does it suggest any benefit from the proposed 220-222 MHz allocation, other than the belief that (somehow) such an allocation might possibly encourage the use of narrowband use at 150-174 MHz. However, MST notes that:

> [A] more appropriate and effective way to achieve this objective would be to phase-in mandatory use of 5 kHz narrowband channels in spectrum already allocated to and used by land mobile, the 150-174 MHz band. In PR Docket 84-279 the Commission approved voluntary interleaving of narrowband 5 kHz channels with the existing wideband allocations in the 150-174 MHz band. Narrowband Operations, 57 R.R.2d 1439 (1985). As the comments already submitted in this proceeding suggest, this policy of encouraging voluntary interleaving has been unsuccessful because the mileage separations necessary to protect existing wideband services preclude the introduction of 5 kHz technologies in urban areas.
>
> Allocating additional spectrum for land mobile operations is clearly not the most efficient or effective way to address this problem. Allocating the 220-222 MHz band to narrowband technology in the hope that this will facilitate the transition to 5 kHz channels in the 150-174 band authorized in PR Docket 84-279 is, at best, a "second best" policy that may prove wholly ineffective.

> Instead, the Commission should impose regulations which will require the introduction of narrowband systems and phase-out the existing wideband systems in the 150-174 MHz band. Without a plan to require conversion to narrowbanding, interference complications posed by the existing wideband services will continue to prevent the efficient use of this spectrum.
>
> (Comments of MST, at 2,3; footnotes omitted.)

The remainder of MST's Comments refer to its concern that land mobile operation at 220-222 MHz in areas of Channel 11 or 13 assignments can cause serious interference within one mile of the land mobile transmitter, which would necessitate limitations on any land mobile allocation in that segment.

22. The remaining comments in this category are from television broadcast licensees[8/] which support or echo the Comments of MST. Mountain States Broadcasting specifically notes that "a preferable way to meet the spectrum needs of land mobile users would be a gradual phasing-in of a 5 kHz narrowband channel requirement in the 150-174 MHz band that is already allocated to and being used for land mobile operations." Overall, these broadcast entities which have no interest whatsoever in amateur

8/ These include Mountain States Broadcasting; Gannett Co., Inc.; Stauffer Communications; Iowa Public Broadcasting Board; Guy Gannett Publishing Company; Northern Television, Inc.; and Albritton Communications.

radio nonetheless have independently arrived at the same conclusion that the amateur commenters repeatedly expressed: that it makes no sense whatsoever to establish a separate frequency allocation in an effort to encourage use of narrowband technology in existing land mobile bands.

23. The League has noted the Reply Comments filed by the New Jersey Public Broadcasting Authority ("NJPBA") which strongly advise against the Commission's proposed reallocation. NJPBA notes the affiliation between the New Jersey EBS plan and the State Civil Defense and RACES program. NJPBA provides antenna and transmitter space on its television broadcasting towers for RACES and Civil Defense communications on 220 MHz repeaters throughout the state. It is concerned that the compression of non-repeater users into the 222-225 MHz segment, should the 220-222 MHz segment be withdrawn from amateur use, would result in overcrowding and interference to RACES repeater operations in New Jersey on 222-225 MHz. The system is working well now, says NJPBA, and thus suggests that the entire 220-225 MHz band be retained for amateur use.

V.
Comments of Land Mobile Representatives

24. Obvious in its absence in this proceeding are comments of individual land mobile users. This is a noteworthy phenomenon. Amateurs have submitted well-reasoned comments in vast numbers. Those who would benefit on a pecuniary basis from the

proposal are silent. Only the land mobile equipment manufacturers are in support of the proposal, reflective of the lack of market interest in the type of narrowband communications envisioned by the proposed reallocation. There are other reasons for the lack of response from the land mobile users, however, primary among them being a lack of any real utility of the allocations based on the size of the proposed band. The Comments of Western Mobile Communications, Inc. discuss this issue:

> 1. The amount of spectrum allocated will not be large enough to make a substantive impact in congested areas, where it is needed most. As such, it is doubtful that enough manufacturers will be interested in providing equipment so as to substantially change the current ACSSB manufacturing picture. This will prevent ACSSB from becoming cost competitive with other (read 800 MHz trunked) radio systems. Little spectrum relief will be gained as a result.
>
> 2. The allocation of two megahertz is just enough to be a band planning problem. If used for repeaters at one megahertz input/output spacing, numerous technical problems become apparent, such as:
>
> > A. Increased cost of base station duplexer/filter hardware.
> >
> > B. Difficulty in duplex mobile operation.
> >
> > C. Poor band plan trade-offs between relay and simplex communication channel requirements.
> >
> > D. Relay input/output interference near the confluence of the two 1 MHz sections, where co-site relay interference could occur.

> • If input/output spacing different than 1 MHz is used, the above problems only get worse, and not better. In summary, the allocation is too small.
>
> (Comments of Western Mobile Communications, Inc., at 1,2.)

This lack of utility was noted by other commenters, including Commonwealth Edison ("CE"). CE noted that:

> [S]ince only 2 MHz is being made available, there can only be one MHz of separation between the transmit and receive frequencies of mobile relay systems . . . [J]amming the transmitter and receiver channels so close together must be regarded as an unhealthy situation.

CE thus recommended that the Commission "reexamine its stance" on the matter and consider either the 216-220 MHz band or other VHF spectrum for land mobile use, including data channels.

25. Other commenters in this category recommended that the Commission allocate 216-220 MHz for land mobile use instead. Meridian Oil and Calais Repair Service, Inc. each suggested that the 216-220 MHz segment be allocated for fixed data use, as did AMOCAMS, Inc., a manufacturer of telemetry and SCADA systems. The Comments of the Amoco Corporation, Telecommunications Department, were similarly focused, though, without stating reasons therefor, "generally support" the Commission's proposal.

26. Of more importance are the substantive Comments of LAOAD Radio and Microwave Communications Consultants ("LAOAD") (one of the four petitioners in this proceeding), which "only reluctantly" support the proposal. LAOAD notes, however, that:

> Although the reallocation of this 2 MHz to Land Mobile could be construed as being

> responsive in part to our petition, inasmuch as it provides sorely needed spectrum for the introduction of narrowband technologies in a non-hostile environment, we take no joy in this act of robbing Peter to subsidize Paul. We feel that some of the Commission's arguments in justification of the move relating to a low level of activity on the part of the amateurs in this portion of the band reflect inaccurate information or faulty conclusions, especially in relation to certain areas of the country such as the West Coast. We do hope that the Commission will be able to come up with an alternative to displacement of the Amateurs from 220-222 MHz!
>
> (Comments of LAOAD, at 5.)

LAOAD offers such alternatives and thus, overall, does not support the Commission's proposal as a good means of accommodating whatever "needs" the land mobile community now may have. Never, LAOAD states, did it intend to displace amateurs. The Commission should carefully review the alternatives suggested by LAOAD and acknowledge the interest of this petitioner in retaining the entire amateur allocation at 220-225 MHz.

27. Even those few comments which indicate support of the Commission's proposal seek to minimize the impact of their desire for more land mobile spectrum on amateur radio. These commenters are misled by the false statement in the Notice that amateur loading is light at 220-222 MHz, and assume therefrom that there would be only minimal impact on amateurs from the Commission's proposal. For example, the Land Mobile Communications Council ("LMCC") and the Utilities Telecommunications Council ("UTC") make the following, totally unsupported evaluations:

> Moreover, as the Commission accurately noted, reallocating the 220-222 MHz band as proposed

> would have, at worst, a "minimal impact" on the Amateur Radio Services currently licensed in this spectrum. The majority of the Amateur operations in the 220-225 MHz band appear to be located in the 222-225 MHz portion of the band, the current loading of the 220-222 MHz band is relatively light, and there are other bands available for Amateur radio use.
>
> (LMCC Comments, at 4,5.)

> Moreover, as the Commission noted, shifting the amateur services to the 222-225 MHz portion of the band would have minimal impact on the hobbyists that comprise the amateur services. The majority of their operations in the 220-225 MHz band are located in the 222-225 MHz segment of the band. Also, other amateur bands are available which would sufficiently satisfy amateur services' requirements. Thus, the pressing need to provide the land mobile radio services with additional spectrum clearly outweighs any inconvenience that the hobbyists may experience from the shifting of the amateur services to the 222-225 MHz band.
>
> (UTC Comments, at 4; footnotes omitted.)

These commenters[9/] blindly parrot the Commission's erroneous assumptions in the Notice. It will inevitably remain evermore a mystery how LMCC can claim that the impact on amateurs from the proposed reallocation would be minimal "at worst." LMCC obviously has no idea whatsoever what the impact is. Its statement is as incompetent as it is wrong. UTC's characterization of

9/ The Comments of LMCC and UTC were prepared by the same attorney and reflect similar, if not identical, points.

amateurs as "hobbyists" is equally unfair. Fortunately, the recognition of the immense public benefit of amateur radio is not dependent on the pejorative characterizations of UTC. Finally, it is clear that UTC has no more substantive basis than does the Commission for its incorrect assumption that other amateur bands offer a sufficient substitute for the 220-222 MHz segment. As discussed hereinabove, there can be no reaccommodation of the fixed links and packet relays now operating at 220-222 MHz.

28. Other land mobile commenters offer a greater understanding of amateur radio. The Associated Public-Safety Communications Officers, Inc. ("APCO") states that:

> While APCO supports the allocations proposed by the Commission, APCO emphasizes that due regard must be given to the interests of the Amateur Radio Service, which could be injured by the Commission's proposal . . . APCO has a very high regard for the amateur radio service. The pioneers of two-way radio were amateurs, and amateurs have made many valuable contributions to the advancement of technology. Moreover, amateurs offer an invaluable volunteer service to assist Public Safety during times of emergency, both individually and throughout their organizations. The disaster planning of virtually every city, county and state involves extensive use of radio amateurs. APCO views with concern any attempt to reduce the amount of spectrum set aside for use by the service.
>
> (APCO Comments, at 5.)

Obviously, APCO is not in a position to turn down the offer of additional land mobile spectrum. Neither, however, do its Comments reflect any need or desire for the 220-222 MHz band specifically. They do affirmatively seek to protect amateur

allocations, however, and the conclusion to be drawn from this is that alternative spectrum, such as 216-220 MHz, should be allocated for narrowband land mobile communications. Unused UHF television channels are another alternative presently under consideration. The amateur 220-225 MHz allocation must, however, remain intact in order to (a) continue the emergency and public service capabilities of amateur repeater operation; and (b) continue the rapid development of emergency communications via high-speed packet networks and regional data links.

29. SIRSA, the Special Industrial Radio Service Association, also asks that the Commission "carefully consider" the needs of the Amateur Radio Service in this proceeding, as it provides a "valuable public service." SIRSA is interested in additional land mobile spectrum and affirmatively requests additional access to 216-220 MHz. It makes no argument that 220-222 MHz is specifically necessary for land mobile use, but rather only that some additional spectrum is desirable. The Comments of NABER in this proceeding are similar. While lip service is paid to the Commission's proposal, the emphasis is on access to 216-220 MHz.

30. The only substantive Comments available to the League which specifically urge the adoption of a 220-222 MHz allocation are those of Tel-Air Communications, Inc. ("Tel-Air"); Aerotron, Inc. ("Aerotron"); and the Association of American Railroads ("AAR"). AAR notes that a separate 220-222 MHz allocation is desirable as a means of implementing narrowband technology. It

states that "however, AAR is of the opinion that narrowband technology should not be superimposed on existing mobile communications systems until more is known about its actual operational characteristics." This point indicates that, as the Society of Broadcast Engineers noted, existing amplitude-companded SSB technology is still in the developmental stage and is not ready for a dedicated frequency allocation. This is especially true where the allocation would displace and frustrate the development of a far more spectrum-efficient data technology, which holds greater long-term promise for the Land Mobile Service than does narrowband analog voice modulation. AAR and Tel-Air each offer little justification for their support of 220 MHz land mobile allocations. Tel-Air merely touts the propagation characteristics of the band (which are as critically important to amateurs as they might be to any other radio service wishing entry to the band), and states that "the product for 220 MHz. ACSB inland mobile applications is available now." If this is a reference to equipment availability, it is also true that many millions of dollars worth of amateur equipment is also available for the band and is operational. Finally, Tel-Air notes that:

> We again applaud the FCC in their dedication to the objective of greater spectrum efficiency, and we know that any decision to take spectrum from the amateurs is difficult in light of their continuing contributions to all of the communication industries. However, the benefits to be gained by all spectrum users with the development and implementation of narrowband technologies far outweighs [sic] the amateurs' objections to losing 2 MHz while retaining 3 MHz for their use.

As discussed hereinabove, it is not obviously true that "all spectrum users" will benefit from the development and implementation of narrowband technology in this portion of the spectrum. It is not even apparent that the Land Mobile Service will benefit from it. Given the valuable uses amateurs make of the 220-222 MHz segment, it is certainly not true that the amateurs' interests are "outweighed" by the unnecessary usurpation of amateur spectrum.

31. Aerotron's Comments reiterate the desire for a greater than 2 MHz allocation, at 216-222 MHz, but note that a 2 MHz allocation is a "minimum acceptable portion of dedicated spectrum." Though Aerotron claims to be "fully aware" of the concerns of amateurs, and claims "many close associations with amateur radio people [sic]," it is obvious from Aerotron's Comments that it hasn't the slightest understanding of the needs or concerns of amateurs relative to use of the 220-225 MHz band. Aerotron admits that the amateur allocation has been in constant jeopardy, and has had the cloud of co-primary allocation status with fixed and mobile services. It then states that:

> [T]he Commission's proposal in this Notice should be supported by perceptive amateurs, because it proposes to give them exclusive primary use of 222 to 225 MHz. Amateurs should view this proposed action as a very positive step, because it would tend to eliminate the nebulous nature of the previous allocation.
>
> (Aerotron Comments, at 7.)

In addition to revealing a total ignorance of existing occupancy of the 220-225 MHz band, that remark ignores a number of facts. First, amateurs have, as a matter of fact, occupied the entire 220-225 MHz band since the 1940's, because of the relative dearth of government radiolocation in the band over the years. While the constant threats of loss of the allocation from 1971 to the present have created a disincentive to use of the band, nonetheless, the saturation of all lower-frequency bands necessitated the development of repeaters at 220-225 MHz. The present, extensive use of the entire 220-225 MHz band by amateurs makes Aerotron's suggestion that amateurs should be pleased to have the allocation "clarified" (by loss of 40% of it) naive indeed. The argument is akin to saying the American Indians should be pleased that they are put on tiny reservations, because they can call reservation land their own exclusively. That they formerly had full use of, and need for other land is, to Aerotron's way of thinking, irrelevant.

32. Aerotron next claims that the "Commission's research" has indicated that "only minor use is made of the 220 to 225 MHz frequencies by the amateurs," and that NTIA had earlier found the same thing. There was, however, no "Commission research" on the subject, and the unfounded assumptions of the Notice as to amateur use of the band, especially the 220-222 MHz segment, have been overwhelmingly shown by the comments to be flatly wrong. NTIA's 1981 study of the 216-225 MHz band showed extensive use by amateurs of the 220-225 MHz segment and a relative absence of use

of the 216-220 MHz segment. The 1984 NTIA study[10/] cited by Aerotron does not stand for the proposition that 220-225 MHz is not used heavily by amateurs. Rather, it notes only that "an area of concern in the 220-225 MHz portion of this band is the potential interactions with amateur assignments." It goes on to note that repeater assignments are predominant in the upper portion of the band. It is, indeed, the predominance of repeaters in the 222-225 MHz segment which precludes assimilation therein of the fixed links, weak-signal work, and the rapidly-developing packet relay stations and networks now operating at 220-222 MHz. Thus, Aerotron's assumption that the "few" amateurs which would be displaced from the 220-222 MHz segment have the "technical capability" to move up to the 222-225 MHz segment is incorrect. The problem is not one of technical ability, but of band saturation above 222 MHz; the incompability of merging the type of uses at 220-222 MHz with those established above 222 MHz; and the unique need for the 220-222 MHz segment for developing packet networks. Nor is Aerotron's implicit accusation that the amateur frequency allocation at 220-225 MHz is being used inefficiently[11/] well taken. Aerotron obviously hasn't any idea what

10/ Assessment of Narrowband Modulation Technologies for Government Land Mobile Operations, NTIA Report 84-156, July 1984.

11/ Aerotron's Comments, at 7-8, state that "in addition, we believe that the amateurs' experience with narrowband operation will encourage them to expand their use of this technology if they feel a shortage of spectrum."

spectrum conservation efforts are in use by amateurs, as its Comments reflect a complete ignorance of amateur band occupancy at 220-225 MHz. Amateurs are pioneers in spectrum efficiency. As noted by the Comments of the Society of Broadcast Engineers, amateurs have developed and improved on narrowband technology; the equipment now marketed by Aerotron and others is, says SBE, not in step with improvements generated by amateurs. It is safe to say, however, that the rampant growth in amateur digital and packet communications should serve as notice that the future of land mobile communications lies in digital packet networks, and not in the amplitude companded single sideband technology which has already been rejected by the land mobile marketplace.

33. Finally, Aerotron's Comments defend the efficiency of its ACSB equipment against attacks by EIA and NABER, which claim difficulties in fitting narrowband channels between existing FM channels. Aerotron states, at Footnote 12, that:

> As noted previously, Aerotron's actual experience with interstitial 5 kHz bands has shown such fears to be baseless. ACSB works well alongside the less efficient FM technology.

This being the case, there is obviously no reason why a separate frequency allocation for narrowband land mobile operation is necessary or desirable. The obvious means of encouraging its use is to put it in existing bands, not to create a separate allocation for it.

34. SEA, Inc. is another manufacturer of narrowband equipment, rather than a land mobile user. Its interest in this

proceeding, and that of Aerotron, is therefore parochial, reflecting only its pecuniary interests and not the interests of radio users. In any event, SEA's Comments are strikingly similar to those of Aerotron, and suffer the same flawed reasoning. Several additional statements of SEA, however, justify response.

35. First, SEA, feigning understanding of amateur allocations, claims that the 222-225 MHz segment is "more than adequate" to meet current and foreseeable needs;[12/] and that the alleged "light" loading of the 220 MHz band was the reason why the 220 MHz band was chosen for Novice use rather than the 144-148 MHz band. SEA's argument is a non-sequitur. Surely, the 144-148 MHz band is fully saturated nationwide and could not tolerate the additional loading of Novice licensees. This does not mean, however, that the 220 MHz band is lightly loaded. The influx of new Novices at 222-225 MHz, their only VHF voice band, renders SEA's assumption of the adequacy of a 222-225 MHz allocation absurd. There are 82,734 licensed Novices (April 1987 FCC figures) who for the first time have access to the 222-225 MHz allocation. The attraction of the 220 MHz band is in large part responsible for rapid increases in new Novice licensees, which will inevitably fully occupy the band. The number of new Novice applications recently processed by the FCC are as follows:

Oct. 1986	793
Nov. 1986	1282

12/ See SEA Comments, at 10.

Dec. 1986	1765
Jan. 1987	2139
Feb. 1987	1684 13/
Mar. 1987	736
Apr. 1987	2850

There are 17,000 amateur applications awaiting processing at Gettysburg. In addition to use by existing higher-class licensees, the 222-225 MHz band is right now being saturated with new Novice amateurs. To suggest that all of the amateur operation in the 220-222 MHz band can be accommodated at 222-225 MHz is incredibly naive. Too, SEA's indictment of the use of moonbounce operation at 220-222 MHz as an "inconsequential mode," because contest results show no 220 MHz moonbounce activity, reflects incomplete reasoning. Amateur 220 MHz propagation research is, as commenter William Tynan notes, in its infancy, and should be encouraged, rather than chopped off at the knees. It is not reflected in contest results because of its experimental status, not because of absence of use of the mode.

36. SEA makes much of a statistical analysis of the number of amateurs per megahertz of VHF/UHF spectrum versus the number of authorized transmitters in the Private Land Mobile Radio Services. As with all statistical analyses, however, the study is only as valuable as the integrity of its premises. This is, of

13/ The lower figures for February and March reflect processing backlogs at the FCC's Gettysburg office, as processing staff was diverted from amateur applications to 900 MHz land mobile applications.

course, an apples-and-oranges comparison, and reflects the same type of inaccurate premises as does the Commission's Notice. As established by the 1985 Field Operations Bureau study of land mobile occupancy of the 800 MHz land mobile bands, the number of authorized transmitters is meaningless, as a vast number of licensed stations are not now on the air. FOB found that 66% of the channels for which transmitters were authorized at 800 MHz were not in use in the ten largest markets. Unless SEA can reliably equate authorized transmitters with actual users, which it absolutely cannot, then its statistical comparison fails to support SEA's conclusions. What one is left with is SEA's allegation that amateurs have 69 MHz of spectrum between 30 and 1000 MHz, and land mobile has 90.8 MHz. These figures, the source of which is unclear, are not accurate. Relative to the alleged 69 MHz of amateur spectrum between 30 and 1000 MHz, only 8 MHz is exclusively allocated to amateur radio. SEA also fails to note that 10 MHz at 420-430 MHz has just been allocated to land mobile at Buffalo, Cleveland and Detroit. See, Report and Order, FCC 87-42, released February 13, 1987. Further, the 26 MHz at 902-928 MHz is a secondary, non-interference allocation. The primary allocation in that band is for government and automatic vehicle monitoring uses; it in addition is shared with ISM devices, which decreases its utility for amateur uses. Finally, 902-928 MHz is not available at all near certain military installations.

37. Most puzzling, however, is the source of the 90.8 MHz which SEA claims is available for land mobile use. Review of the

non-government land mobile primary allocations in Part 2 of the rules reveals 198.7625 MHz of such spectrum, not 90.8 as SEA claims.

38. In any event, the unique status of 220-222 MHz to amateurs renders any statistical comparison of overall VHF/UHF allocations irrelevant to this proceeding. The amateur commenters have discussed the absolute inability to reaccommodate fixed links, high-speed packet digipeaters,[14/] and weak-signal communications at 220-222 MHz elsewhere, because of (1) rule limits on auxiliary operation below 220.5 MHz; (2) bandwidth limitations on lower amateur bands; (3) propagation limitations, which limit path lengths above 220-225 MHz; and (4) band loading limitations at 222-225 MHz and on other bands. Thus, SEA's suggestion that the amateur 1240-1300 MHz band or any other band is an effective substitute for 220-222 MHz[15/] is plainly wrong.

39. Adding to the errors in SEA's Comments is its statement that there has been no appreciable increase in amateur use of the 220 MHz band in the last four years,[16/] and that during that time the Amateur Radio Service has been "on notice of the Commission's

14/ SEA, at Footnote 18, acknowledges that digital packet communications protocols are being currently used by amateurs and are spectrum efficient.

15/ SEA Comments, Appendix One, p.A3.

16/ SEA Comments, at 14.

interest in reallocating a portion of the 220 MHz band" to private land mobile. There has been rapid growth in the band, as the League's Comments and those of many others aptly demonstrate. In many areas, double-digit percentage annual increases in the number of coordinated repeaters demonstrate this growth. While surely the Commission's constant threats to the allocation have dampened enthusiasm, nonetheless significant growth has occurred. Loss of 220-222 MHz would be devastating to amateurs.

40. In summary, the land mobile community cannot be characterized as an enthusiastic supporter of the Commission's proposal; most land mobile entities express concern that amateur allocations should not be disturbed, and no commenter is insistent that the 220-222 MHz segment be used, as opposed to other frequencies, such as the 216-220 MHz band. The two or three commenters (who seek to profit from increased sale of narrowband equipment) which express support for the allocation offer no reasoned support. Rather, they merely parrot the flawed reasoning and incorrect assumptions on which the Notice in this proceeding was based. There is no justification for the proposal to oust amateurs from this band.

VI.
Comments of Other Aspirants to a 220-222 MHz Frequency Allocation

41. Little time need be spent on the comments in this category, which include those of the Association of Radio Reading Services, Inc. ("ARRS") and the Personal Communications Section

of the Electronic Industries Association's Information and Telecommunications Technologies Group ("PCSEIAITTG")[17]. Each of these entities propose uses of the 220 MHz band not envisioned by, and completely outside the scope of the instant proceeding. As such, it would not be proper in this proceeding for the Commission to affirmatively adopt either proposal.[18] Solely to the extent, however, that they provide reasons not to adopt a land mobile allocation at 220-222 MHz, they can be considered by the Commission.

42. In the case of ARRS' proposal to set aside a 500 kHz segment of the 220-225 MHz band for radio reading services for the blind and print handicapped, the Commission has already considered a Petition for Rule Making[19] requesting the same relief, and rejected it.[20] The Commission found that existing means for providing radio reading services are sufficient; that FM subcarrier use, which is growing, is an adequate means of accommodating such services; and that ARRS' proposal was unrealistic in terms of costs. ARRS has sought reconsideration of the Commission's Order dismissing its Petition. That proceeding

17/ Mea Culpa.

18/ See 5 U.S.C. §553.

19/ RM-5434.

20/ See the Order, FCC 87-41, released February 20, 1987.

adequately addresses the ARRS proposal and it need not, and should not be discussed on its merits herein.

43. The Comments of PCSEIAITTG are similarly outside the scope of the instant proceeding, and do not in any case provide any justification for displacement of amateur radio at 220-225 MHz. Those Comments suggest use of 220 MHz spectrum for cordless telephones. PCSEIAITTG notes that negotiations with IRAC for extension of cordless telephone use of 46/49 MHz channel pairs is ongoing, and it is not timely under the circumstances to consider other spectrum allocations for these Part 15 devices. PCSEIAITTG further notes that a proceeding to allocate 900 MHz frequencies for cordless telephones is still pending. Its needs can thus be adequately addressed without reference to amateur radio 220-225 MHz spectrum.

VII.
Conclusion

44. The comments of the Amateur Radio Service in this proceeding provide overwhelming justification for, and establish the necessity of continued amateur use of the entire 220-225 MHz band. Uses which cannot be accommodated elsewhere exist there, and deprivation of that spectrum will cripple the rapid development of amateur packet technology. That technology stands to benefit the land mobile industry far more than does the narrowband analog voice technology which would replace it at 220-222 MHz. The supporting comments of a large number of state and local government agencies which depend on amateurs and their use

of 220-225 MHz, and which are already benefitted by amateur 220 MHz packet technology, cannot be ignored. The broadcast entities, which have no connection with amateur radio, independently conclude that a better alternative in implementing narrowband land mobile technologies would be to incorporate them in existing land mobile bands (which Aerotron claims presents no technical problem). Even the few land mobile comments filed urged a greater degree of Commission attention to the needs of the Amateur Radio Service, which has not been accorded by the Commission in this proceeding thus far. Finally, the very few supporting comments provide no reasoned support for the Commission's proposal, but merely parrot the incorrect assumptions in the Notice on which this proceeding is based.

THEREFORE, the foregoing considered, the American Radio Relay League, Incorporated again requests that the Commission not adopt the Notice proposal, but instead continue the amateur allocation at 220-225 MHz in its entirety.

Respectfully submitted,

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

By: _____
Christopher D. Imlay,
Its Counsel

225 Main Street
Newington, CT 06111

Booth, Freret & Imlay
1920 N Street, N.W., Suite 520
Washington, D.C. 20036
(202) 296-9100

June 19, 1987

CERTIFICATE OF SERVICE

I, Storm D. Jamison, a law clerk for the law firm of Booth, Freret & Imlay, do hereby certify on this 19th day of June, 1987, that I have caused a copy of the foregoing **REPLY COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED** to be mailed, via first class U.S. mail, postage prepaid, to the offices of the following:

*Michael T.N. Fitch, Esquire
Chief, Private Radio Bureau
Federal Communications Commission
2025 M Street, N.W., Room 5002
Washington, D.C. 20554

*Dr. Thomas P. Stanley
Office of Engineering & Technology
Federal Communications Commission
2025 M Street, N.W., Room 7002
Washington, D.C. 20554

Vermont Independent Coordinating
Committee (VIRCC)
Post Office Box 99
Essex, Vermont 05451

Mr. Phillip R. Karn, Jr.
Radio Amateur Satellite Corp.
25B Hillcrest Road
Warren, NJ 07060

Gary Hendrickson
Middle Atlantic FM and
Repeater Council (T-MARC)
1419 Larch Road
Severn, MD 21144

Raymond L. Browning, Sr.
Post Office Box 1638
Henderson, KY 42420

Charles Zabilski, Esquire
9620 Sepulveda Boulevard, Suite 11
Sepulveda, CA 91343
(Counsel for 220 MHz Spectrum Management
Association of Southern California)

Charles J. Zabilski, Esquire
9620 Sepulveda Boulevard, Suite 11
Sepulveda, CA 91343
(Counsel for North Hollywood Remote Base Association)

William A. Tynon
13620 Colefair Drive
Silver Spring, MD 20904

Department of General Services of the Commonwealth of Pennsylvania
Bureau of Telecommunications and Information Technology Services
Department of General Services
Post Office Box 1365
Harrisburg, PA 17105

Gary David Gray, P.E.,
Chief Telecommunications Engineer
County of Orange, California
GSA Communications Division
481 The City Drive South
Orange, CA 92668

The State of New York Emergency Management Office
Public Security Building
State Campus
Albany, NY 12226-5000

The State of Massachusetts Civil Defense Agency & Office of Emergency Preparedness
400 Worcester Road
Post Office Box 1496
Framingham, MA 01701-0317

Unified San Diego Emergency Services Organization
1600 Pacific Highway
San Diego, CA 92101

The Sheriff of San Diego
Post Office Box 2991
San Diego, CA 92112

The Operations Officer of the Office of Disaster Preparedness of San Diego County
5201 Q-Ruffin Road
San Diego, CA 92123

City of Sacramento
Radio Officer
Office of Emergency Planning
1231 "I" Street, Suite 401
Sacramento, CA 95814

The Encinitas (CA) Fire
Protection Department
543 Encinitas Boulevard, #109
Encinitas, CA 92024

The Monroe (MI) Fire Chief and
Civil Preparedness Coordinator
75 Scott Street
Monroe, MI 48161

The Air Force Association Chapter
in Fairbanks, Alaska
Midnight Sun Chapter #362
Post Office Box 1644
Fairbanks, AK 99707

The American Red Cross
Scranton, Pennsylvania Chapter
545 Jefferson Avenue
Scranton, PA 18510

The American Red Cross
Monroe County, Michigan Chapter
202 South Macomb Street
Monroe, MI 48161

The American Red Cross
Oregon Trail Chapter
John D. White, Chairman
Red Cross Communications Unit
Post Office Box 13274
Portland, OR 97213

The American Red Cross
Niagara Falls Chapter
719 Ashland Avenue
Niagara Falls, NY 14301

The R.W. Johnson Company
Consulting Engineers
2820 Grant Street
Concord, CA 94520

Society of Broadcast Engineers
7002 Graham Road, Suite 118
Indianapolis, IN 46220

William G. Bowles, P.E.
Post Office Box 405
Rolla,, MO 65401

McKenzie Whitaker, Trial Attorney
J. Randolph Macpherson
Department of Defense
Washington, D.C. 20305-2000

Michael Tonkersby, Esquire
Gregory M. Schmidt, Esquire
Covington & Burling
1201 Pennsylvania Avenue, N.W.
Post Office Box 7566
Washington, D.C. 20044
(Counsel for The Association of
Maximum Service Telecasters)

Marnie K. Sarner, Esquire
Pete O'Connel, Esquire
Pierson, Ball & Dowd
1200 18th Street, N.W.
Washington, D.C. 20036
(Counsel for Gannett Co., Inc.)

Thomas J. Hutton, Esquire
Dow, Lohnes & Albertson
1255 23rd Street, N.W., #500
Washington, D.C. 20554
(Counsel for Guy Gannett Publishing
Company, Stauffer Communications, Inc.,
Iowa Public Broadcasting Board)

Allbritton Communications
2320 Longhorne Road
Post Office Box 11588
Lynchburg, VA 24506-1588

Jonathon D. Blake, Esquire
Michael T. Buckly, Esquire
Covington & Burling
1201 Pennsyvlania Avenue
Post Office Box 7566
Washington, D.C. 20044
(Counsel for Mountain States Broadcasting)

Larry H. Will
New Jersey Public Broadcasting
Authority
1573 Parkside Avenue
Trenton, NJ 08638

J.W. Johnson
Commonwealth Edison
One First National Plana
Chicago, IL 60690

Kerry Vasburg,
District Production Supervisor
Meridian Oil
Post Office Box 39
Ventress, LA 70763

Amocams
411 S. Eisenhower Lane
Lombard, IL 60148

K. Bruce Fingerle, Manager
Amoco Corporation
200 East Randolph Drive
Post Office Box 5910A
Chicago, Illinois 60680

Robert M. Snyder, President
Microwave Communications Consultants
Route 5, Box 62
Lockport, IL 60441

Charles Meehan
Nina Benstein
Land Mobile Communications Council
1150 17th Street, N.W., Suite 100
Washington, D.C. 20036

Keller & Hechman
Suite 1000
1150 17th Street, N.W.
Washington, D.C. 20036
(Counsel for Utilities Telecommunications
Council)

Robert E. Tall, Executive Director
The Associated Public Safety
Communications Officers, Inc.
Post Office Box 669
New Smyrna Beach, FL 32070

Wayne V. Block, Esquire
Maureen A. O'Connell, Esquire
Keller & Hechman
Suite 1000
1150 17th Street, N.W.
Washington, D.C. 20036
(Counsel for The Special Industrial
Radio Service Association)

David E. Weisman, Esquire
Alan S. Tilles, Esquire
Meyer, Faller, Weisman & Greenberg, P.C.
4400 Jenifer Street, N.W., Suite 380
Wahington, D.C. 20015
(Counsel for NABER)

Geroge Stites, Systems Engineer
Tel-Air Communications, Inc.
156 Woodport Road
Sparta, NJ 07871

Hallis G. Duensing, General Solicitor
Association of American Railroads
50 F Street, N.W.
Washington,, D.C. 20001

William Potts, Esquire
Haley, Bader & Potts
2000 M Street, N.W., Suite 600
Washington, D.C. 20036
(Counsel for Aerotron)

Thomas J. Keller, Esquire
Michael J. Wilhelm, Esquire
Verner, Liipfert, Bernhard,
McPherson & Hand
1660 L Street, N.W., Suite 1000
Washington, D.C. 20036
(Counsel for SEA, Inc.)

J. Brian DeBoice, Esquire
Cohn & Marks
Suite 600
1333 New Hampshire Avenue, N.W.
Washington, D.C. 20036
(Counsel for Association of Radio
Reading Services, Inc.)

Eric Schimmel
Information and Telecommunications
Technologies Group
Personal Communications Section
Electronic Industries Association
2001 "Eye" Street, N.W., 4th Floor
Washington, D.C. 20006

Storm D. Jamison

* Via Hand Delivery

June 19, 1987